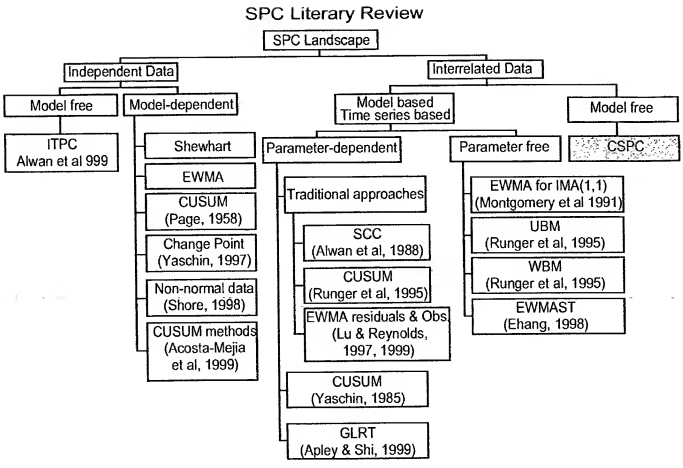

Fig. 1 SPC Characterization methods

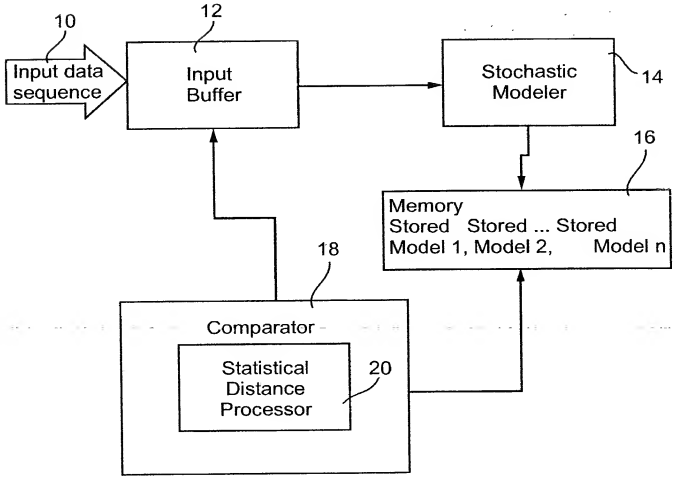
10
12
Input data sequence
Input Buffer
Stochastic Modeler
14
16
Memory
Stored Stored ... Stored
Model 1, Model 2, Model n
18
Comparator
Statistical Distance Processor
20

Fig. 2

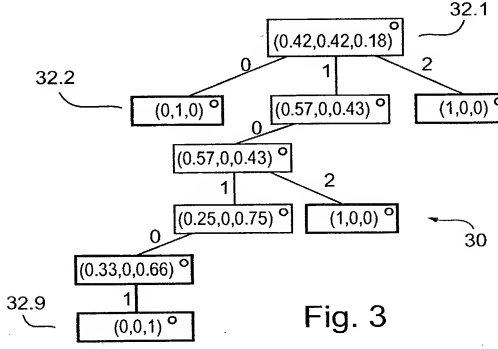
32.1
(0.42,0.42,0.18)
0
1
2
32.2
(0,1,0)
(0.57,0,0.43)
(1,0,0)
0
(0.57,0,0.43)
1
2
(0.25,0,0.75)
(1,0,0)
30
0
(0.33,0,0.66)
1
32.9
(0,0,1)

Fig. 3

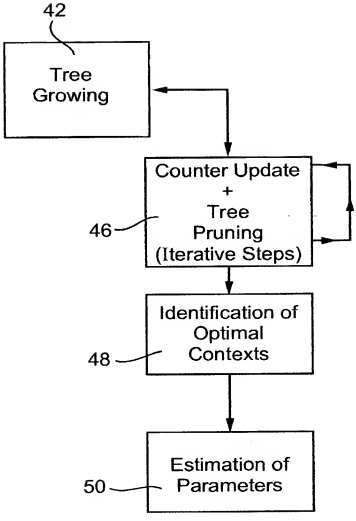
42
Tree Growing
Counter Update + Tree Pruning (Iterative Steps)
46
Identification of Optimal Contexts
48
Estimation of Parameters
50

Fig. 4

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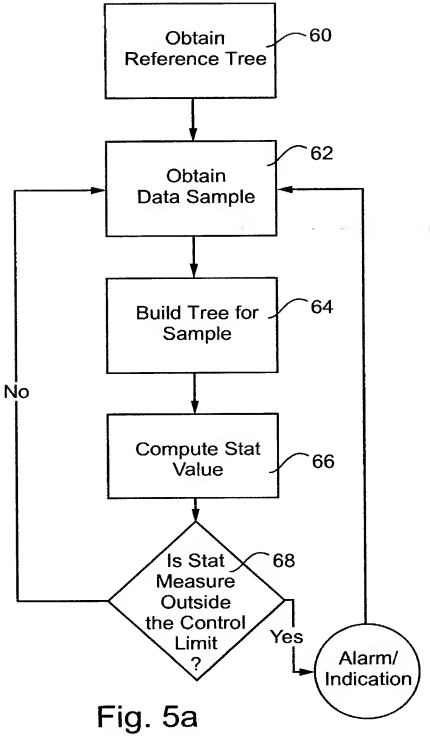

Fig. 5a

WO 2004/070620 A2

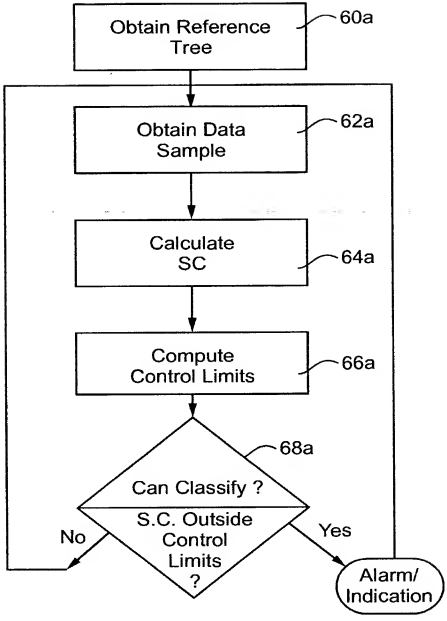

Fig. 5b

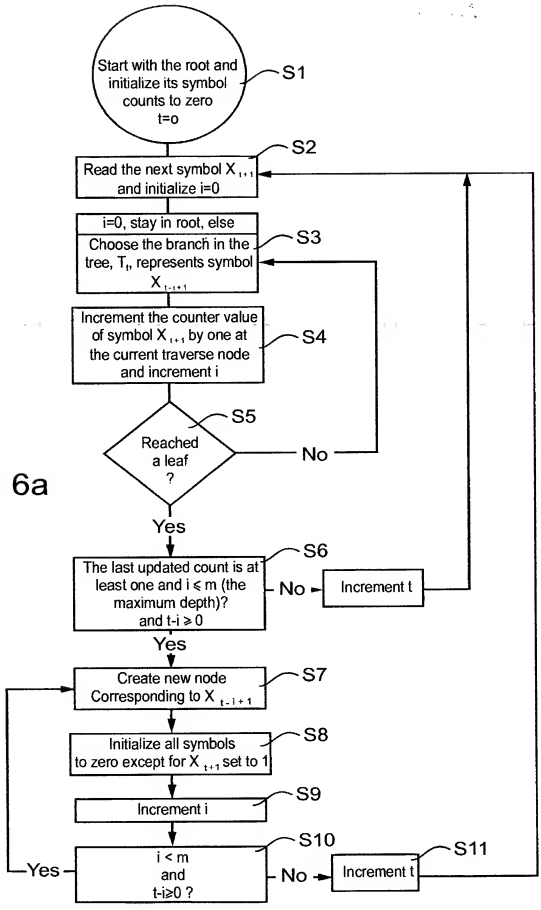
Start with the root and initialize its symbol counts to zero t=o
S1
Read the next symbol X t+1 and initialize i=0
S2
i=0, stay in root, else
Choose the branch in the tree, Tt, represents symbol X t-i+1
S3
Increment the counter value of symbol X t,i by one at the current traverse node and increment i
S4
Reached a leaf ?
S5
No
Yes
The last updated count is at least one and i ≤ m (the maximum depth)? and t-i ≥ 0
S6
No
Increment t
Yes
Create new node Corresponding to X t-i+1
S7
Initialize all symbols to zero except for X t+1 set to 1
S8
Increment i
S9
i < m and t-i≥0 ?
S10
Yes
No
Increment t
S11

Fig. 6a

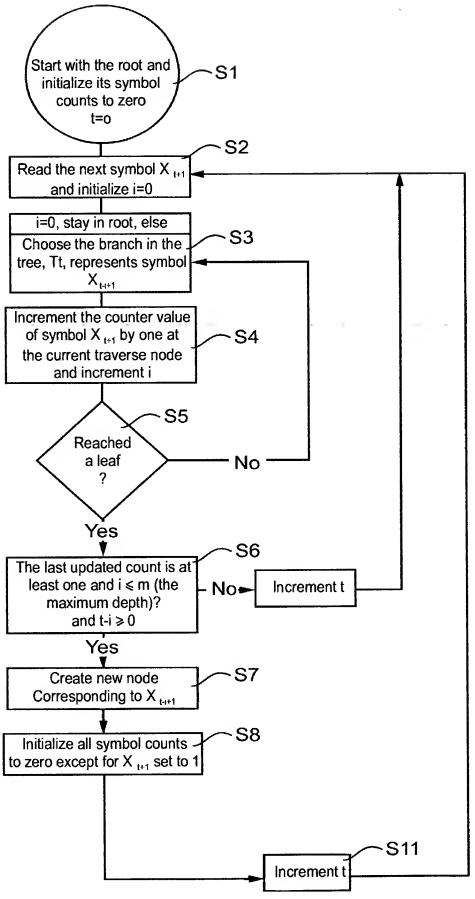
Start with the root and initialize its symbol counts to zero t=o
S1
Read the next symbol X t+1 and initialize i=0
S2
i=0, stay in root, else Choose the branch in the tree, Tt, represents symbol X t+1
S3
Increment the counter value of symbol X t+1 by one at the current traverse node and increment i
S4
Reached a leaf ?
S5
No
Yes
The last updated count is at least one and i ≤ m (the maximum depth)? and t-i ≥ 0
S6
No
Increment t
Yes
Create new node Corresponding to X t+1
S7
Initialize all symbol counts to zero except for X t+1 set to 1
S8
Increment t
S11

Fig. 6b

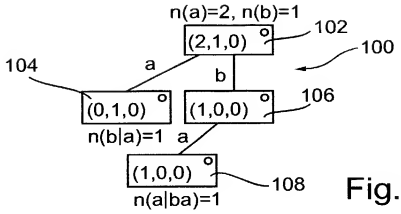

Fig. 7

The counter context tree constructed from x_3=a,b,a

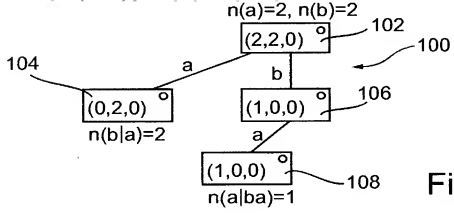

Fig. 8

The counter context tree constructed from x^4=a,b,a,b following step 1.1

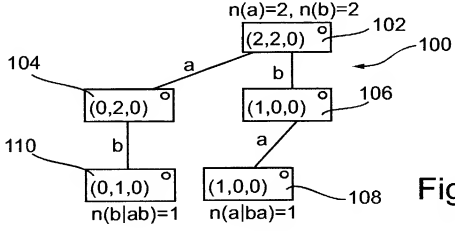

Fig. 9

The counter context tree constructed from x^4=a,b,a,b;
partial application of step 1.2

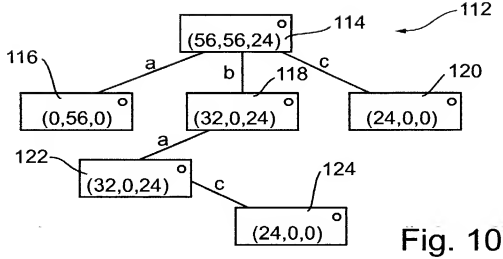

Fig. 10

The pruned counter context-tree of the string (a,b,a,b,c,a,b,a,b,c,a,b,a,b,a,b,c) replicated 8 times

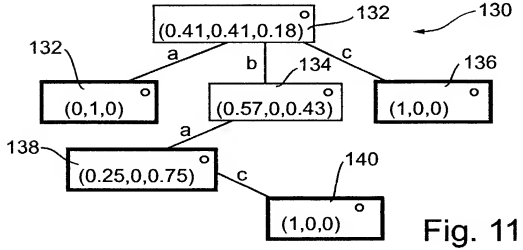

Fig. 11

The context tree containing vectors of conditional probabilities P(x|s) as obtained from the counter context-tree in figure A4. Optimal contexts are represented by the bolded frame

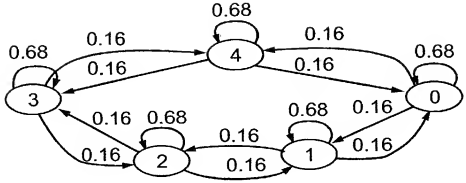

Fig. 12 State transition diagram

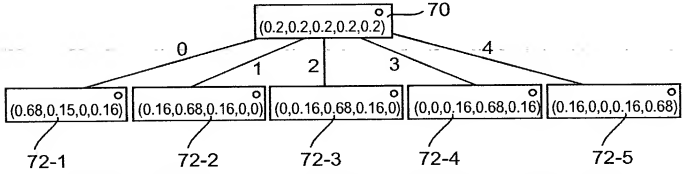

Fig. 13 The analytically derived singled-level context-tree

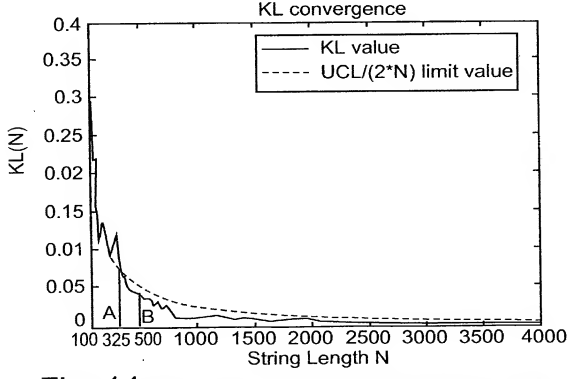

Fig. 14 KL value in relation to input string length N

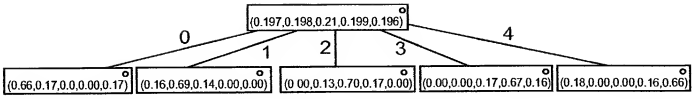

Fig. 15 Estimated reference context-tree resulted from the implementation of context algorithm to N=1000

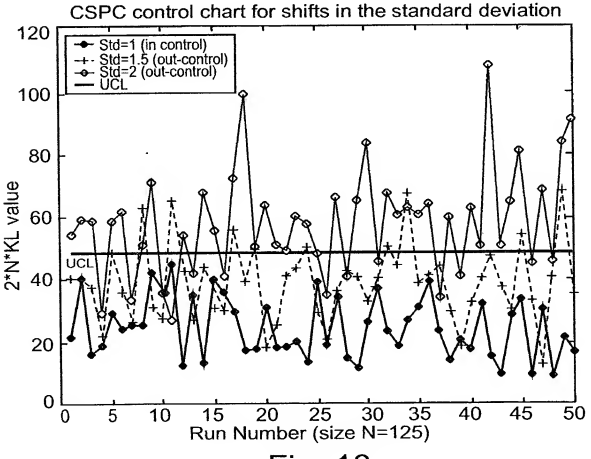

Fig. 16

Shifts in the process underlying normal standard deviation λ=1,1.5,2 (number of runs for each process properties is equal to 50)

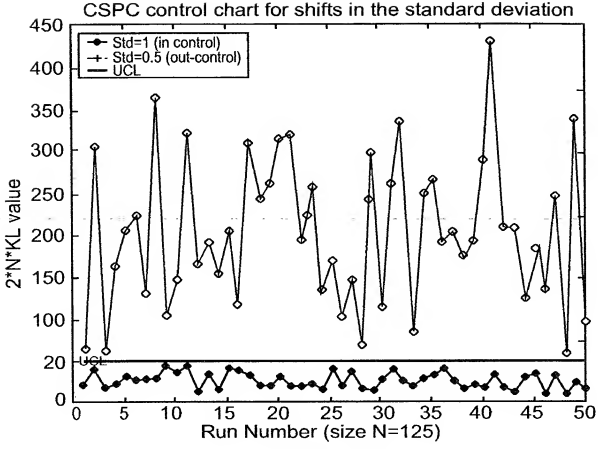

Fig. 17

Shift in the process underlying normal standard deviation λ=0.5 (number of runs equal to 50)

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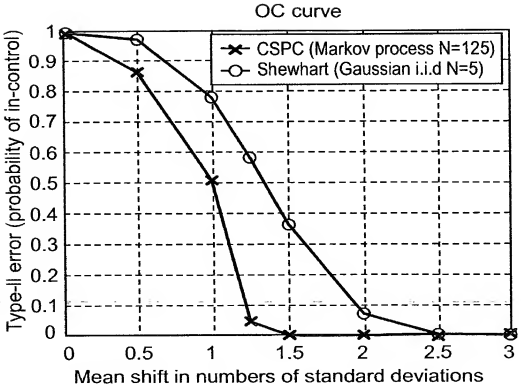

Fig. 18

Operating characteristics curve

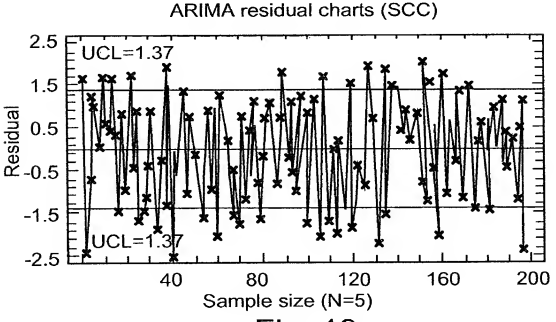

Fig. 19

The SCC control chart for "in-control" data

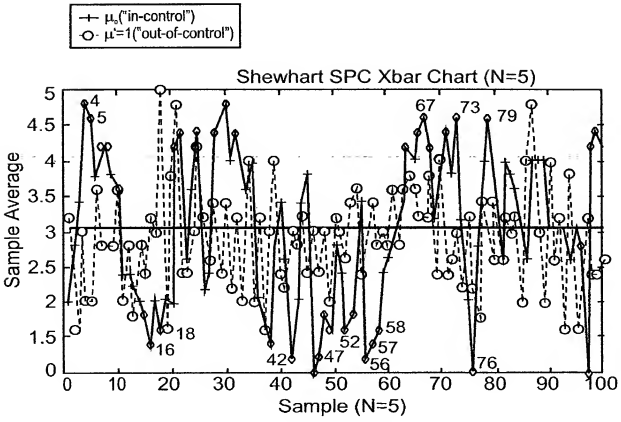

Fig. 20

Shewhart SPC $\overline{X}$ chart-"in-control" data (solid line) and "out-of-control" data (dashed line)

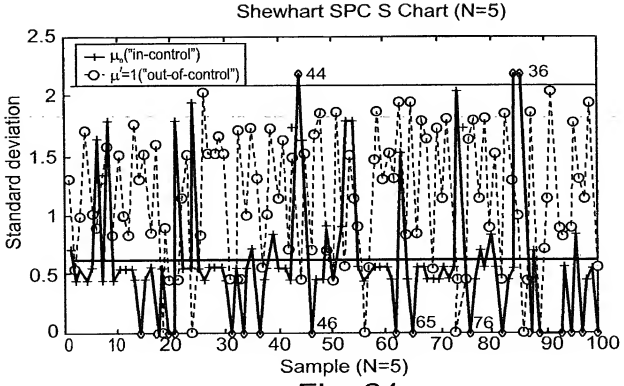

Fig. 21

Shewhart SPC *S* chart-"in-control" data (solid line) and "out-of-control" data (dashed line)

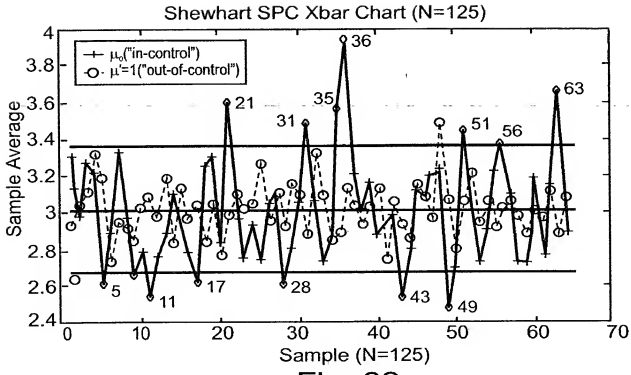

Fig. 22

Shewhart SPC $\overline{X}$ chart for N=125 sample size - "in-control" data (solid line) and "out-of-control"data (dashed line)

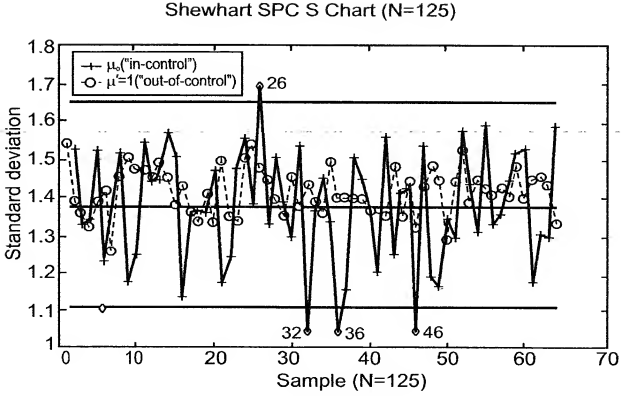

Fig. 23

Shewhart SPC S chart for N=125sample -"in-control" data (solid line) and "out-of-control"data (dashed line)